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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: N. MATSUNAMI, et al.

Serial No.: 10/822,700

Filed: April 13, 2004

For: STORAGE SYSTEM WITH HETEROGENOUS STORAGE,
CREATING AND COPYING THE FILE SYSTEMS, WITH
WRITE ACCESS ATTRIBUTE (Amended)

Group: 2188

Examiner: D. T. Doan

SUPPLEMENTAL AMENDMENT

MS Amendment

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

September 17, 2008

Sir:

Applicants herewith submit a Supplemental Amendment to the Amendment filed on August 11, 2008 in response to the Office Action mailed May 9, 2008 in connection with the above-identified application. Further reconsideration and withdrawal of the outstanding rejections and allowance of the present application are respectfully requested in view of the following amendments and remarks.

Amendments to the Claims

Remarks are included following the amendments.

IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

1-20. (canceled).

21. (currently amended): A first storage system connected, via a network, to a management terminal, a computer, and a second storage system, comprising:

a memory;

a first storage device which stores data related to a first file system;

a first controller which provides the first file system and a second file system to a computer; and

a second controller for controlling input/output operations to/from the second storage system with location of data related to the second file system,

wherein the second storage system includes a second storage device which stores the data related to the second file system and a third controller, connected to the second controller, for controlling the second storage device,

wherein the first controller mounts a root directory of the second file system at a mount point of the first file system in the first storage system such that the first and second file systems are provided to the computer as a single directory tree,

wherein the second controller accesses the second storage system with a command representing an area where the data related to the second file system is stored in the second storage device,

wherein the first storage system is coupled to the second storage system via a storage area network (SAN) and communicates therewith according to a block input/output (I/O) interface,

wherein the first storage system is coupled to the computer via a local area network (LAN) and communicates therewith according to a file I/O interface,

wherein each of the first storage device and the second storage device configures a plurality of logical volumes,

wherein the second storage system is of a type different from the first storage system, and when a request to access the second file system is received from the computer, the first controller converts the request into a command for a logical volume of the second storage device, and the second controller sends the command to the second storage system, via the third controller,

wherein the memory stores a volume management table, which comprises:

a logical volume identifier that identifies each of the plurality of logical volumes;

wherein each of the plurality of logical volumes stores only files that were created on a same date;

a Write Once Read Many (WORM) identifier that provides a WORM attribute indicating whether a write only once and a read many times operation is permitted for each of the plurality of logical volumes; and

a file system identifier that identifies either a primary file system or a secondary file system corresponding to each of the plurality of logical volumes.

wherein the primary file system is stored in the first storage system and the secondary file system is stored in the second storage system,

wherein the volume management table further comprises, for each of the plurality of logical volumes other than the logical volume corresponding to a primary file system comprising the first file system, a date that indicates when files were stored in the primary file system,

wherein at a second date, the files stored in the primary file system on a first date are migrated from the first storage system to the secondary file system in the second storage system.

wherein after migration at the second date, the management terminal updates the file system identifier in the volume management table to indicate that the files migrated from the primary file system are now stored in the secondary file system, and updates the WORM identifier corresponding to the files stored on the first date to indicate that the write only once and a read many times operation is permitted for the files stored on the first date, and the secondary file system is mounted on the first file system such that the migration is not recognized by the computer, and

wherein the single directory tree has a total capacity including a capacity of the first storage device and a capacity of the second storage device, and the computer has a transparent single view of the second file system without being aware of whether the second file system resides in the first storage system or the second storage system.

22. (canceled).

23. (previously presented): A first storage system according to claim 21, wherein the first storage system is connected to the computer via a first network, and the second storage system is connected to the computer via a second network different from the first network.

24. (canceled).

25. (previously presented): A first storage system according to claim 21,

wherein the first controller receives an access request for a file from the computer, if the access request identifies a file configuring data stored in the second storage device, the first controller accesses data related to the file stored in the second storage device through the second controller.

26. (previously presented): A first storage system according to claim 21,

wherein the first controller manages location of data related to the first file system and the second file system, if the first controller receives a request for data related to the second file system, and

wherein the first controller sends location of data to the second storage system via the second controller.

27. (previously presented): A first storage system according to claim 21,

wherein each of the first storage device and the second storage device configuring a plurality of logical volumes,

wherein the first controller manages relationship between either the first or the second file system and a logical volume of said plurality of logical volumes related to either the first file system or the second file system, if a request for the second file system is received, the first controller specifies the location of the logical volume is configured to the second storage device in the second storage system according to the relationship, and

wherein the first controller sends information related to the logical volume to the second controller, the second controller sends a command, to the second storage system via a communication line, including the information related to the logical volume to the second controller.

REMARKS

The present Amendment amends claim 21, and leaves claims 23 and 25-27 unchanged. Therefore, the present application has pending claims 21, 23, and 25-27.

Interview Summary

Applicants thank the Examiner for granting the interview conducted on August 15, 2008, and for conducting several follow-up discussions regarding the amended claim language. In the interview, arguments were presented to overcome the cited references, particularly Gole and Wong. The Examiner and Applicants' representative did not come to an agreement with regard to the arguments presented. However, the Examiner recommended further amending the claims to include features of the WORM attribute, to more clearly distinguish over the prior art. In this response, Applicants have incorporated the Examiner's recommendations.

35 U.S.C. §103 Rejections

Claims 21-23 and 25-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0015460 to Gole et al. ("Gole") in view of U.S. Patent No. 2001/0051955 to Wong. As discussed in the amendment filed on August 11, 2008, claim 22 was canceled. Therefore, this rejection regarding claim 22 is rendered moot. This rejection regarding the remaining claims 21, 23 and 25-27 is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 21, 23 and 25-27, are not taught or suggested by Gole or Wong, whether taken individually or in combination with each other in the manner suggested by the Examiner.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to more clearly describe features of the present invention. Applicants submit that neither Gole nor Wong, whether taken alone or in combination, teach or suggest a first storage system as recited, for example, in independent claim 21.

For example, Gole and Wong fail to teach or suggest “wherein the memory stores a volume management table, which comprises:

a logical volume identifier that identifies each of the plurality of logical volumes, wherein each of the plurality of logical volumes stores only files that were created on a same date;

a Write Once Read Many (WORM) identifier that provides a WORM attribute indicating whether a write only once and a read many times operation is permitted for each of the plurality of logical volumes; and

a file system identifier that identifies either a primary file system or a secondary file system corresponding to each of the plurality of logical volumes, wherein the primary file system is stored in the first storage system and the secondary file system is stored in the second storage system,

wherein the volume management table further comprises, for each of the plurality of logical volumes other than the logical volume corresponding to a primary file system comprising the first file system, a date that indicates when files were stored in the primary file system” as recited in claim 21.

By way of further example, Gole and Wong fail to teach or suggest “wherein at a second date, the files stored in the primary file system on a first date are migrated from the first storage system to the secondary file system in

the second storage system” and “wherein after migration at the second date, the management terminal updates the file system identifier in the volume management table to indicate that the files migrated from the primary file system are now stored in the secondary file system, and updates the WORM identifier corresponding to the files stored on the first date to indicate that the write only once and a read many times operation is permitted for the files stored on the first date, and the secondary file system is mounted on the first file system such that the migration is not recognized by the computer” as recited in claim 21.

Both Gole and Wong suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Gole and Wong in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 21, 23 and 25-27 as being unpatentable over Gole in view of Wong are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 21, 23 and 25-27.

In view of the foregoing amendments and remarks, Applicants submit that claims 21, 23 and 25-27 are in condition for allowance. Accordingly, early allowance of claims 21, 23 and 25-27 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (500.43772X00).

Respectfully submitted,

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CIB/DKM/cp
703-684-1120